17. An apparatus for processing a process region of a substrate, using a plasma, comprising:

a container substantially formed of a conductive material;

a partition plate supported by said container and defining an air-tight process container portion and an air-tight auxiliary container portion, and having a window plate made of dielectric;

a main exhaust pump for exhausting and setting said process container portion to a vacuum;

a work table arranged in said process container portion and having a support face facing said window plate, the substrate being mountable on said support face with the process region facing said window plate;

a main supply for supplying a process gas between said window plate and the substrate mounted on said support face, at least part of the process gas being transformable into the plasma;

an antenna for generating an electromagnetic field between said window plate and the substrate mounted on said support face to induce generation of the plasma, arranged in said auxiliary container portion and facing said window plate;

a power supply section for applying a high frequency voltage to said antenna;

an auxiliary exhaust pump for exhausting and setting said auxiliary container portion to a vacuum; and

a pressure controller connected to said auxiliary exhaust pump for keeping a pressure difference between pressures in said process and auxiliary container portions at a minimum value.

18. The apparatus according to claim 17, further comprising grounding means for grounding said container.

19. The apparatus according to claim 17, wherein said pressure controller is connected to said main exhaust pump.

20. The apparatus according to claim 17, further comprising a cooler for cooling said antenna.

21. The apparatus according to claim 17, further comprising an auxiliary supply for supplying an inactive gas into said auxiliary container portion.

22. The apparatus according to claim 21, wherein said inactive gas supplied into said auxiliary container portion is a coolant, by which said antenna is cooled.

23. The apparatus according to claim 22, wherein said auxiliary supply comprises a shower head arranged above said antenna and having a plurality of gas supply holes facing said antenna.

24. The apparatus according to claim 17, further comprising a seat arranged on said window plate and supporting said antenna.

25. The apparatus according to claim 24, wherein a passage through which coolant is circulated is formed in said seat.

26. The apparatus according to claim 17, further comprising a lower electrode arranged in said work table and a power supply for applying a high frequency potential to said lower electrode.

27. The apparatus according to claim 26, wherein said apparatus is a plasma CVD apparatus to form a film on the process region of the substrate, the process gas being decomposable to provide a material of the film.

28. The apparatus according to claim 27, wherein the process gas comprises first and second gases, and the main supply comprises first and second supply members respectively for supplying the first and second gases, and wherein the second gas is transformable into the plasma when the first gas is excited and decomposed by said plasma.

29. The apparatus according to claim 28, wherein said first supply member includes a supply port arranged between said window plate and said support face, and said second supply member includes a supply port arranged between said window plate and said supply port of said first supply member.

30. The apparatus according to claim 29, wherein said first supply member comprises a first supply head arranged between said window plate and said support face and made of dielectric, and said supply port of said first supply member comprises a plurality of supply holes formed on said first supply member and arranged to uniformly cover the whole of the process region of the substrate mounted on said support face.

31. The apparatus according to claim 30, wherein said first supply head comprises a lattice formed of a combination of pipe elements through which the first gas flows.

32. The apparatus according to claim 31, wherein said second supply member comprises a second supply head arranged between said window plate and said first supply head, made of dielectric, and comprising a continuous frame formed of a combination of pipe elements through which the second gas flows, and said supply port of said second supply member comprises a plurality of supply holes formed on said second supply member.

33. The apparatus according to claim 17, wherein said pressure controller is connected to said auxiliary exhaust pump.

34. The apparatus according to claim 17, wherein said partition plate is supported on an inner surface of said container.

35. The apparatus according to claim 17, wherein said pressure controller controls an output of said auxiliary exhaust pump according to a pressure in said process container portion.

36. The apparatus according to claim 21, wherein said pressure controller controls an output of said auxiliary exhaust pump according to an amount of inactive gas supplied by said auxiliary supply.

37. An apparatus for processing with a plasma a process region of a substrate, comprising:

a container;

a dielectric window supported by said container and defining a first container portion and a second container portion separated by said dielectric window;

a table for supporting the substrate in said first container portion to face said window;

a first exhaust means connected to said first container portion for drawing a vacuum in said first container portion;

a first supply for supplying a process gas to said first container portion;

an antenna for generating an electromagnetic field between said window and the substrate supported on said table to induce generation of the plasma, said antenna being provided in said second container portion proximate said window;

a power supply for supplying a voltage to said antenna;

a second exhaust means connected to said second container portion for drawing a vacuum in said second container portion; and

a second supply for supplying an auxiliary gas to said second container portion;

wherein at least one of said first and second exhaust means are controllable to control a pressure differential across said window at a minimum value.

38. The apparatus according to claim 37, further comprising a controller for controlling said first exhaust means to control the pressure differential.

39. The apparatus according to claim 37, further comprising a controller for controlling the second exhaust means to control the pressure differential.

40. The apparatus according to claim 37, wherein said second exhaust means is controllable according to an amount of the auxiliary gas supplied by said second supply to control the pressure differential across said window at the at the minimum value.

41. The apparatus according to claim 37, wherein said second exhaust means includes an exhaust pump controllable to control the pressure differential across said window at the minimum value.

42. The apparatus according to claim 41, further comprising a controller for controlling said exhaust pump.

43. The apparatus according to claim 37, further comprising a controller for controlling the second exhaust means according to the supply of the auxiliary gas through said second supply, to control the pressure differential across said window as the minimum value.

44. The apparatus according to claim 37, wherein said second exhaust means is controllable according to a pressure in said first container portion.

45. The apparatus according to claim 37, wherein said first exhaust means includes an exhaust pump.

46. The apparatus according to claim 45, further comprising a controller connected to said exhaust pump.

47. The apparatus according to claim 37, wherein said container is substantially formed of a conductive material.

48. The apparatus according to claim 37, wherein said dielectric window is supported on an inner surface of said container.

49. The apparatus according to claim 37, further comprising grounding means for grounding said container.

50. The apparatus according to claim 37, further comprising a cooler for cooling said antenna.

51. The apparatus according to claim 37, wherein said auxiliary gas is a coolant by which said antenna is cooled.

52. The apparatus according to claim 37, wherein said second supply comprises a shower head arranged above said antenna and having a plurality of gas supply holes facing said antenna.

53. The apparatus according to claim 37, further comprising a seat arranged on said window and supporting said antenna.

54. The apparatus according to claim 53, wherein a passage through which a coolant is circulated is formed on said seat.

55. The apparatus according to claim 37, further comprising a lower electrode arranged in said work table and a power supply for applying a high frequency potential to said lower electrode.

56. The apparatus according to claim 37, wherein said apparatus is a plasma CVD apparatus to form a film on the process region of the substrate, the process gas being decomposable to provide a material of the film.

57. The apparatus according to claim 37, wherein the process gas comprises first and second gases, and the first supply comprises first and second supply members respectively for supplying the first and second gases, and wherein the second gas is transformable into the plasma when the first gas is excited and decomposed by said plasma.

58. The apparatus according to claim 57, wherein said first supply member includes a supply port arranged between said window and said table, and said second supply member includes a supply port arranged between said window and said supply port of said first supply member.

59. The apparatus according to claim 58, wherein said first supply member comprises a first supply head arranged between said window and said table and made of dielectric, and said supply port of said first supply member comprises a plurality of supply holes formed on said first supply member and arranged to uniformly cover the whole of the process region of the substrate mounted on said table.

60. The apparatus according to claim 59, wherein said first supply head comprises a lattice formed of a combination of pipe elements through which the first gas flows.

61. The apparatus according to claim 60, wherein said second supply member comprises a second supply head arranged between said window and said first supply head, made of dielectric, and comprising a continuous frame formed of a combination of pipe elements through which the second gas flows, and said supply port of said second supply member comprises a plurality of supply holes formed on said second supply member.

62. The apparatus according to claim 37, wherein the pressure differential across said window is controlled to be in a preselected range.

63. The apparatus according to claim 37, wherein said dielectric window has a thickness in a preselected range.

64. An apparatus for processing a substrate in a plasma, comprising:

a container;

a dielectric window supported by said container and dividing said container into a first container portion and a second container portion;

first vacuum means for creating a first vacuum in said first container portion;

second vacuum means for creating a second vacuum in said second container portion;

a controller for controlling at least one of said first and second vacuum means in order to control a differential pressure across said window at a minimum value;

a table arranged in said first container portion for supporting the substrate;

a first supply for supplying a process gas to said first container portion;

an antenna arranged in said second container portion; and

a voltage supply to said antenna for generating an electromagnetic field whereby generation of the plasma is induced in said first container portion.

65. The apparatus according to claim 64, further comprising a second supply for supplying an inactive gas to said second container portion.

66. The apparatus according to claim 65, wherein said controller controls said second vacuum means to draw vacuum in accordance with an amount of inactive gas supplied to said second container portion via said second supply.

67. The apparatus according to claim 64, wherein said controller controls said second vacuum means to draw vacuum in said second container portion in accordance with a pressure in said first container portion.

68. The apparatus according to claim 64, wherein said controller includes means for controlling said first vacuum means.

69. The apparatus according to claim 64, wherein said container is formed of a conductive material.

70. The apparatus according to claim 64, wherein said dielectric window is supported on an inner surface of said container.

71. The apparatus according to claims 1, 17, 37 or 64, wherein said window has a thickness of approximately 30 mm to approximately 50 mm.

72. The apparatus according to claim 64, further comprising grounding means for grounding said container.

73. The apparatus according to claim 64, further comprising a cooler for cooling said antenna.

74. The apparatus according to claim 65, wherein said inactive gas is a coolant by which said antenna is cooled.

75. The apparatus according to claim 65, wherein said second supply comprises a shower head arranged above said antenna and having a plurality of gas supply holes facing said antenna.

76. The apparatus according to claim 64, further comprising a seat arranged on said window and supporting said antenna.

77. The apparatus according to claim 76, wherein a passage through which coolant is circulated is formed in said seat.

78. The apparatus according to claim 64, further comprising a lower electrode arranged in said table and a power supply for applying a high frequency potential to said lower electrode.

79. The apparatus according to claim 64, wherein said apparatus is a plasma CVD apparatus to form a film on the substrate, the process gas being decomposable to provide a material of the film.

80. The apparatus according to claim 79, wherein the process gas comprises first and second gases, and the main supply comprises first and second supply members respectively for supplying the first and second gases, and wherein the second gas is transformable into the plasma when the first gas is excited and decomposed by said plasma.

81. The apparatus according to claim 80, wherein said first supply member includes a supply port arranged between said window and said table, and said second supply

member includes a supply port arranged between said window and said supply port of said first supply member.

82. The apparatus according to claim 81, wherein said first supply member comprises a first supply head arranged between said window and said table and made of dielectric, and said supply port of said first supply member comprises a plurality of supply holes formed on said first supply member and arranged to uniformly cover the substrate mounted on said table.

83. The apparatus according to claim 82, wherein said first supply head comprises a lattice formed of a combination of pipe elements through which the first gas flows.

84. The apparatus according to claim 83, wherein said second supply member comprises a second supply head arranged between said window and said first supply head, made of dielectric, and comprising a continuous frame formed of a combination of pipe elements through which the second gas flows, and said supply port of said second supply member comprises a plurality of supply holes formed on said second supply member.

85. An apparatus for processing a process region of a substrate, using a plasma, comprising:

a container substantially formed of a conductive material;

a partition plate supported by said container and defining an air-tight process container portion and an air-tight auxiliary container portion, and having a window plate made of dielectric;

a work table arranged in said process container portion and having a support face facing said window plate, the substrate being mountable on said support face with the process region facing said window plate;

a main supply for supplying a process gas between said window plate and the substrate mounted on said support face, at least part of the process gas being transformable into the plasma;

an antenna for generating an electromagnetic field between said window plate and the substrate mounted on said support face to induce generation of the plasma, arranged in said auxiliary container portion and facing said window plate;

a power supply section for applying a high frequency voltage to said antenna; and

a pressure controller controlling a pressure difference between a pressure in said process container portion and a pressure in said auxiliary container portion lower than a predetermined value.

86. The apparatus according to claim 85, further comprising an exhaust pump connected to at least one of the container portions, wherein the pressure controller controls operation of said exhaust pump to control the pressure difference.

87. The apparatus according to claim 85, further comprising grounding means for grounding said container.

88. The apparatus according to claim 85, further comprising a cooler for controlling a temperature of said antenna.

89. The apparatus according to claim 85, further comprising a coolant flow passage including a coolant flow for cooling said antenna.

90. The apparatus according to claim 85, further comprising a seat arranged on said window plate and supporting said antenna.

91. The apparatus according to claim 90, wherein a passage through which coolant is circulated is formed in said seat.

92. The apparatus according to claim 85, further comprising a lower electrode arranged in said work table and a power supply for applying a high frequency potential to said lower electrode.

93. The apparatus according to claim 92 wherein said apparatus is a plasma CVD apparatus to form a film on the process region of the substrate, the process gas being decomposable to provide a material of the film.

94. The apparatus according to claim 93, wherein the process gas comprises first and second gases, and the main supply comprises first and second supply members respectively for supplying the first and second gases, and wherein the second gas is transformable into the plasma when the first gas is excited and decomposed by said plasma.

95. The apparatus according to claim 94, wherein said first supply member includes a supply port arranged between said window plate and said support face, and said second supply member includes a supply port arranged between said window plate and said supply port of said first supply member.

96. The apparatus according to claim 95, wherein said first supply member comprises a first supply head arranged between said window plate and said support face and made of dielectric, and said supply port of said first supply member comprises

a plurality of supply holes formed on said first supply member and arranged to uniformly cover the whole of the process region of the substrate mounted on said support face.

97. The apparatus according to claim 96, wherein said first supply head comprises a lattice formed of a combination of pipe elements through which the first gas flows.

98. The apparatus according to claim 97, wherein said second supply member comprises a second supply head arranged between said window plate and said first supply head, made of dielectric, and comprising a continuous frame formed of a combination of pipe elements through which the second gas flows, and said supply port of said second supply member comprises a plurality of supply holes formed on said second supply member.

99. The apparatus according to claim 85, wherein said partition plate is supported on an inner surface of said container.

100. An apparatus for processing with a plasma a process region of a substrate, comprising:

a container;

a dielectric window supported by said container and defining a first container portion and a second container portion separated by said dielectric window;

a table for supporting the substrate in said first container portion to face said window;

a first supply for supplying a process gas to said first container portion;

an antenna for generating an electromagnetic field between said window and the substrate supported on said table to induce generation of the plasma, said antenna being provided in said second container portion proximate said window;

a power supply for supplying a voltage to said antenna;

a second supply for supplying an auxiliary gas to said second container portion;

wherein a pressure difference between a pressure in said first container portion and a pressure in said second container portion is controllable below a predetermined value to reduce a load caused by the pressure difference on said dielectric window.

101. The apparatus according to claim 100, further comprising a controller for controlling the pressure difference.

102. The apparatus according to claim 101, further comprising an exhaust pump connected to at least one container portion, wherein the controller controls operation of said pump.

103. The apparatus according to claim 100, wherein said container is substantially formed of a conductive material.

104. The apparatus according to claim 100, wherein said dielectric window is supported on an inner surface of said container.

105. The apparatus according to claim 100, further comprising grounding means for grounding said container.

106. The apparatus according to claim 100, further comprising a cooler for controlling a temperature of said antenna.

107. The apparatus according to claim 100, further comprising a coolant flow passage including a coolant flow for cooling said antenna.

108. The apparatus according to claim 100, further comprising a seat arranged on said window and supporting said antenna.

109. The apparatus according to claim 108, wherein a passage through which a coolant is circulated is formed in said seat.

110. The apparatus according to claim 100, further comprising a lower electrode arranged in said work table and a power supply for applying a high frequency potential to said lower electrode.

111. The apparatus according to claim 100, wherein said apparatus is a plasma CVD apparatus to form a film on the process region of the substrate, the process gas being decomposable to provide a material of the film.

112. The apparatus according to claim 100, wherein the process gas comprises first and second gases, and the first supply comprises first and second supply members respectively for supplying the first and second gases, and wherein the second gas is transformable into the plasma when the first gas is excited and decomposed by said plasma.

113. The apparatus according to claim 112, wherein said first supply member includes a supply port arranged between said window and said table, and said second supply member includes a supply port arranged between said window and said supply port of said first supply member.

114. The apparatus according to claim 113, wherein said first supply member comprises a first supply head arranged between said window and said table and made of dielectric, and said supply port of said first supply member comprises a plurality of supply holes formed on said first supply member and arranged to uniformly cover the whole of the process region of the substrate mounted on said table.

115. The apparatus according to claim 114, wherein said first supply head comprises a lattice formed of a combination of pipe elements through which the first gas flows.

116. The apparatus according to claim 115, wherein said second supply member comprises a second supply head arranged between said window and said first supply head, made of dielectric, and comprising a continuous frame formed of a combination of pipe elements through which the second gas flows, and said supply port of said second supply member comprises a plurality of supply holes formed on said second supply member.

117. The apparatus according to claim 100, wherein said dielectric window has a thickness in a preselected range.

118. The apparatus according to claim 100, wherein the pressure difference is controlled at a value that is lower than atmospheric pressure.

119. The apparatus according to claims 85 or 100, wherein said window has a thickness of approximately 30 mm to approximately 50 mm.

120. An apparatus for processing a process region of a substrate, using a plasma, comprising:

a container substantially formed of a conductive material;

a partition plate supported by said container and defining an air-tight process container portion and an air-tight auxiliary container portion, and having a window plate made of dielectric;

an exhaust pump for exhausting and setting at least one of said container portions to a vacuum;

a work table arranged in said process container portion and having a support face facing said window plate, the substrate being mountable on said support face with the process region facing said window plate;

a main supply for supplying a process gas between said window plate and the substrate mounted on said support face, at least part of the process gas being transformable into the plasma;

an antenna for generating an electromagnetic field between said window plate and the substrate mounted on said support face to induce generation of the plasma, arranged in said auxiliary container portion and facing said window plate;

a power supply section for applying a high frequency voltage to said antenna; and

a pressure controller connected to said exhaust pump for keeping a pressure difference between pressures in said process and auxiliary container portions at a minimum value.

121. The apparatus according to claim 120, further comprising grounding means for grounding said container.

122. The apparatus according to claim 120, further comprising a cooler for cooling said antenna.

123. The apparatus according to claim 120, further comprising an auxiliary supply for supplying an inactive gas into said auxiliary container portion.

124. The apparatus according to claim 123, wherein said inactive gas supplied into said auxiliary container portion is a coolant, by which said antenna is cooled.

125. The apparatus according to claim 124, wherein said auxiliary supply comprises a shower head arranged above said antenna and having a plurality of gas supply holes facing said antenna.

126. The apparatus according to claim 120, further comprising a seat arranged on said window plate and supporting said antenna.

127. The apparatus according to claim 126, wherein a passage through which coolant is circulated is formed in said seat.

128. The apparatus according to claim 120, further comprising a lower electrode arranged in said work table and a power supply for applying a high frequency potential to said lower electrode.

129. The apparatus according to claim 128, wherein said apparatus is a plasma CVD apparatus to form a film on the process region of the substrate, the process gas being decomposable to provide a material of the film.

130. The apparatus according to claim 129, wherein the process gas comprises first and second gases, and the main supply comprises first and second supply members respectively for supplying the first and second gases, and wherein the second gas is transformable into the plasma when the first gas is excited and decomposed by said plasma.

131. The apparatus according to claim 130, wherein said first supply member includes a supply port arranged between said window plate and said support face, and said second supply member includes a supply port arranged between said window plate and said supply port of said first supply member.

132. The apparatus according to claim 131, wherein said first supply member comprises a first supply head arranged between said window plate and said support face and made of dielectric, and said supply port of said first supply member comprises a plurality of supply holes formed on said first supply member and arranged to uniformly cover the whole of the process region of the substrate mounted on said support face.

133. The apparatus according to claim 132, wherein said first supply head comprises a lattice formed of a combination of pipe elements through which the first gas flows.

134. The apparatus according to claim 133, wherein said second supply member comprises a second supply head arranged between said window plate and said first supply head, made of dielectric, and comprising a continuous frame formed of a combination of pipe elements through which the second gas flows, and said supply port of said second supply member comprises a plurality of supply holes formed on said second supply member.

135. The apparatus according to claim 120, wherein said partition plate is supported on an inner surface of said container.

136. The apparatus according to claim 120, wherein said pressure controller controls an output of said exhaust pump according to a pressure in said process container portion.

137. The apparatus according to claim 123, wherein said pressure controller controls an output of said exhaust pump according to an amount of inactive gas supplied by said auxiliary supply.

138. An apparatus for processing with a plasma a process region of a substrate, comprising:

a container;

a dielectric window supported by said container and defining a first container portion and a second container portion separated by said dielectric window;

a table for supporting the substrate in said first container portion to face said window;

an exhaust means connected to at least one of said container portions for drawing a vacuum;

a first supply for supplying a process gas to said first container portion;

an antenna for generating an electromagnetic field between said window and the substrate supported on said table to induce generation of the plasma, said antenna being provided in said second container portion proximate said window;

a power supply for supplying a voltage to said antenna; and

a second supply for supplying an auxiliary gas to said second container portion;

wherein said exhaust means is controllable to control a pressure differential across said window at a minimum value.

139. The apparatus according to claim 138, further comprising a controller for controlling said exhaust means to control the pressure differential.

140. The apparatus according to claim 138, wherein said exhaust means is controllable according to an amount of the auxiliary gas supplied by said second supply to control the pressure differential across said window at the at the minimum value.

141. The apparatus according to claim 138, wherein said exhaust means includes an exhaust pump controllable to control the pressure differential across said window at the minimum value.

142. The apparatus according to claim 141, further comprising a controller for controlling said exhaust pump.

143. The apparatus according to claim 138, further comprising a controller for controlling said exhaust means according to the supply of the auxiliary gas through said second supply, to control the pressure differential across said window at the minimum value.

144. The apparatus according to claim 138, wherein said exhaust means is controllable according to a pressure in said first container portion.

145. The apparatus according to claim 138, wherein said exhaust means includes an exhaust pump.

146. The apparatus according to claim 145, further comprising a controller connected to said exhaust pump.

147. The apparatus according to claim 138, wherein said container is substantially formed of a conductive material.

148. The apparatus according to claim 138, wherein said dielectric window is supported on an inner surface of said container.

149. The apparatus according to claim 138, further comprising grounding means for grounding said container.

150. The apparatus according to claim 138, further comprising a cooler for cooling said antenna.

151. The apparatus according to claim 138, wherein said auxiliary gas is a coolant by which said antenna is cooled.

152. The apparatus according to claim 138, wherein said second supply comprises a shower head arranged above said antenna and having a plurality of gas supply holes facing said antenna.

153. The apparatus according to claim 138, further comprising a seat arranged on said window and supporting said antenna.

154. The apparatus according to claim 153, wherein a passage through which a coolant is circulated is formed on said seat.

155. The apparatus according to claim 138, further comprising a lower electrode arranged in said work table and a power supply for applying a high frequency potential to said lower electrode.

156. The apparatus according to claim 138, wherein said apparatus is a plasma CVD apparatus to form a film on the process region of the substrate, the process gas being decomposable to provide a material of the film.

157. The apparatus according to claim 138, wherein the process gas comprises first and second gases, and the first supply comprises first and second supply members respectively for supplying the first and second gases, and wherein the second gas is transformable into the plasma when the first gas is excited and decomposed by said plasma.

158. The apparatus according to claim 157, wherein said first supply member includes a supply port arranged between said window and said table, and said second supply member includes a supply port arranged between said window and said supply port of said first supply member.

159. The apparatus according to claim 158, wherein said first supply member comprises a first supply head arranged between said window and said table and made of dielectric, and said supply port of said first supply member comprises a plurality of supply holes formed on said first supply member and arranged to uniformly cover the whole of the process region of the substrate mounted on said table.

160. The apparatus according to claim 159, wherein said first supply head comprises a lattice formed of a combination of pipe elements through which the first gas flows.

161. The apparatus according to claim 160, wherein said second supply member comprises a second supply head arranged between said window and said first supply head, made of dielectric, and comprising a continuous frame formed of a combination of pipe elements through which the second gas flows, and said supply port of said second supply member comprises a plurality of supply holes formed on said second supply member.

162. The apparatus according to claim 138, wherein the pressure differential across said window is controlled to be in a preselected range.

163. The apparatus according to claim 138, wherein said dielectric window has a thickness in a preselected range.

164. The apparatus according to claims 120 or 138, wherein said window has a thickness of approximately 30mm to approximately 50mm.